What is claimed is:

1. A method of detecting typable loci of a genome, comprising the steps of:

(a) providing an amplified representative population of genome fragments comprising said typable loci, wherein said population comprises a high complexity representation;

(b) contacting said genome fragments with a plurality of nucleic acid probes having sequences corresponding to said typable loci under conditions wherein probe-fragment hybrids are formed, wherein said probes are at most 125 nucleotides in length; and

(c) detecting typable loci of said probe-fragment hybrids.

2. The method of claim 1, wherein said population of representative genome fragments comprises sequences identical to at least 5% of the genome.

3. The method of claim 1, wherein said providing in step (a) comprises representationally amplifying a native genome.

4. The method of claim 3, wherein said representationally amplifying comprises using a polymerase of low processivity.

5. The method of claim 3, wherein said low processivity is less than 100 bases per polymerization event.

6. The method of claim 3, wherein said representationally amplifying comprises a single step reaction yielding a high complexity representation.

7. The method of claim 3, wherein at most 1×10^6 copies of said native genome are used as a template for amplification.

8. The method of claim 1, wherein said nucleic acid probes are immobilized on a substrate.

9. The method of claim 8, wherein said substrate is selected from the group consisting of a particle, bead, surface, slide, and microchip.

10. The method of claim 1, wherein at least 100 typable loci are simultaneously detected.

11. The method of claim 1, wherein said genome is a human genome.

12. The method of claim 1, wherein step (b) comprises contacting said genome fragments with a multiplexed array of nucleic acid probes.

13. The method of claim 1, further comprising contacting said array of nucleic acid probes with chaperone probes.

14. The method of claim 1, wherein said probes comprise nucleic acid probes that are at least 20 nucleotides in length.

15. The method of claim 1, further comprising producing a report identifying said typable loci that are detected.

16. A report produced by the method of claim 15.

17. The method of claim 1, wherein step (c) comprises directly detecting said typable loci of said fragments that hybridize to said probes.

18. A method of detecting typable loci of a genome, comprising the steps of:

(a) providing an amplified representative population of genome fragments comprising said typable loci;

(b) contacting said genome fragments with a plurality of nucleic acid probes having sequences corresponding to said typable loci under conditions wherein probe-fragment hybrids are formed; and

(c) directly detecting typable loci of said probe-fragment hybrids

19. The method of claim 18, wherein at most 1000 copies of said native genome are amplified.

20. The method of claim 18, wherein said population of representative genome fragments comprises sequences identical to at least 60% of the genome.

21. The method of claim 18, wherein said plurality of nucleic acid probes has sequences for typable loci linked to at least 5% of the expressed sequences of said genome.

22. The method of claim 18, wherein said providing in step (a) comprises representationally amplifying a native genome.

23. The method of claim 22, wherein said representationally amplifying comprises using a polymerase of low processivity.

24. The method of claim 22, wherein said low processivity is less than 100 bases per polymerization event.

25. The method of claim 22, wherein said representationally amplifying comprises a single step reaction yielding a high complexity representation.

26. The method of claim 22, wherein at most 1×10^6 copies of said native genome are used as a template for amplification.

27. The method of claim 18, wherein said nucleic acid probes are immobilized on a substrate.

28. The method of claim 18, wherein said substrate is selected from the group consisting of a particle, bead, surface, slide, and microchip.

29. The method of claim 18, wherein at least 100 typable loci are simultaneously detected.

30. The method of claim 18, wherein said genome is a human genome.

31. The method of claim 18, wherein step (b) comprises contacting said genome fragments with a multiplexed array of nucleic acid probes.

32. The method of claim 31, further comprising contacting said array of nucleic acid probes with chaperone probes.

33. The method of claim 18, wherein said probes comprise nucleic acid probes are at least 20 nucleotides in length.

34. The method of claim 2, further comprising producing a report identifying said typable loci that are detected.

35. A report produced by the method of claim 34.

36. The method of claim 18, wherein step (c) comprises directly detecting said typable loci of said fragments that hybridize to said probes.

37. A method of detecting typable loci of a genome, comprising the steps of:

(a) providing an amplified representative population of genome fragments comprising said typable loci;

(b) contacting said genome fragments with a plurality of immobilized nucleic acid probes having sequences corresponding to said typable loci under conditions wherein immobilized probe-fragment hybrids are formed;

(c) modifying said immobilized probe-fragment hybrids; and

(d) detecting a probe or fragment modified in step (c), thereby detecting said typable loci of said genome.

38. The method of claim 37, wherein said plurality of nucleic acid probes has sequences for typable loci linked to at least 10% of the expressed sequences of said genome.

39. The method of claim 37, wherein said providing in step (a) comprises representationally amplifying a native genome.

40. The method of claim 39, wherein said representationally amplifying comprises using a polymerase of low processivity.

41. The method of claim 39, wherein said low processivity is less than 100 bases per polymerization event.

42. The method of claim 39, wherein said representationally amplifying comprises a single step reaction yielding a high complexity representation.

43. The method of claim 39, wherein at most 1×10^6 copies of said native genome are used as a template for amplification.

44. The method of claim 37, wherein said nucleic acid probes are immobilized on a substrate.

45. The method of claim 44, wherein said substrate is selected from the group consisting of a particle, bead, surface, slide, and microchip.

46. The method of claim 37, wherein at least 100 typable loci are simultaneously detected.

47. The method of claim 37, wherein said genome is a human genome.

48. The method of claim 37, wherein step (b) comprises contacting said genome fragments with a multiplexed array of nucleic acid probes.

49. The method of claim 48, further comprising contacting said array of nucleic acid probes with chaperone probes.

50. The method of claim 37, wherein said probes comprises nucleic acid probes are at least 20 nucleotides in length.

51. The method of claim 37, further comprising producing a report identifying said typable loci that are detected.

52. A report produced by the method of claim 51.

53. The method of claim 37, wherein step (c) comprises a primer extension assay.

54. The method of claim 53, wherein said primer extension assay is selected from the group consisting of allele specific primer extension (ASPE), single base extension (SBE) and pyrosequencing.

55. A method of amplifying genomic DNA, comprising the steps of:

(a) providing isolated double stranded genomic DNA;

(b) contacting said double stranded genomic DNA with a nicking agent, thereby producing nicked double stranded genomic DNA; and

(c) contacting said nicked double stranded genomic DNA with a strand displacing polymerase and a plurality of primers, wherein said genomic DNA is amplified.

56. The method of claim 55, wherein at most 1000 copies of said isolated double stranded genomic DNA are amplified.

57. The method of claim 55, wherein at least 60% of the genomic DNA is amplified.

58. The method of claim 55, wherein said polymerase is a low processivity polymerase.

59. The method of claim 58, wherein said low processivity is less than 100 bases per polymerization event.

60. The method of claim 55, wherein at most 1×10^6 copies of said isolated double stranded genomic DNA are used as a template for amplification.

61. The method of claim 55, wherein said genome is a human genome.

62. The method of claim 55, wherein said plurality of primers comprise random sequences.

63. The method of claim 55, wherein said nicking agent comprises an isolated nicking agent.

64. A method for detecting typable loci of a genome, comprising the steps of

(a) *in vitro* transcribing a population of amplified genome fragments, thereby obtaining genomic RNA fragments;

(b) hybridizing said genomic RNA fragments with a plurality of nucleic acid probes having sequences corresponding to said typable loci, thereby forming a plurality of RNA fragment-probe hybrids; and

(c) detecting typable loci of said RNA fragment-probe hybrids.

65. The method of claim 64, wherein said population of amplified genome fragments is produced by amplification with a plurality of random primers.

66. The method of claim 64, wherein step (c) comprises modifying said genomic RNA fragment-probe hybrids with reverse transcriptase.

67. The method of claim 66, wherein said modifying comprises replicating said genomic RNA fragments hybridized in said genomic RNA fragment-probe hybrids with a plurality of different locus-specific primers, thereby producing a locus-specific, amplified representative population of genome fragments.

68. The method of claim 67, wherein step (a) comprises *in vitro* transcribing said population of amplified genome fragments using random primers comprising a 3' sequence region that is random and another sequence region having a constant sequence, thereby obtaining genomic RNA fragments labeled with said constant sequence.

69. The method of claim 68, wherein said locus-specific primers comprise a 3' sequence region that is locus-specific and a another sequence region having a second constant sequence, thereby obtaining genomic RNA fragments labeled with said first constant region and said second constant region.

70. The method of claim 69, further comprising a step of replicating the genomic RNA fragments with complementary primers to the first constant region and second constant region.

71. The method of claim 66, wherein said modifying said genomic RNA fragment-probe hybrids with reverse transcriptase occurs under conditions wherein DNA-dependent DNA synthesis is inhibited.

72. The method of claim 64, further comprising a step of isolating said genomic RNA fragments.

73. A method of producing a reduced complexity, locus-specific, amplified representative population of genome fragments, comprising the steps of

(a) replicating a native genome with a plurality of random primers, thereby producing an amplified representative population of genome fragments;

(b) replicating a sub-population of said amplified representative population of genome fragments with a plurality of different locus-specific primers, thereby producing a locus-specific, amplified representative population of genome fragments; and

(c) isolating said sub-population, thereby producing a reduced complexity, locus-specific, amplified representative population of genome fragments.

74. The method of claim 73, wherein said random primers comprise a 3' sequence region that is random and a 5' sequence region having a first constant sequence, thereby producing a reduced complexity, locus-specific, amplified representative population of genome fragments labeled with said constant sequence.

75. The method of claim 74, wherein said locus-specific primers comprise a 3' sequence region that is locus-specific and a 5' sequence region having a second constant sequence, thereby producing a locus-specific, amplified representative population of genome fragments labeled with said first constant region and said second constant region.

76. The method of claim 75, further comprising a step of replicating the reduced complexity, locus specific, amplified representative population of genome fragments with complementary primers to said first constant region and said second constant region.

77. The method of claim 73, further comprising a step of isolating said amplified representative population of genome fragments.